Posttraumatic Stress Disorder in Hemodialysis Patients

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Background: We aim to assess the prevalence and severity of posttraumatic stress disorder (PTSD) in patients who receive long-term hemodialysis (HD) and investigate its correlation with depression, anxiety, health-related quality of life, and service utilization.

Study Design, Setting & Participants: In a cross-sectional study, we recruited 144 HD patients (age, 63.1 ± 14.2 years; 50.7% men) from 5 dialysis units.

Factor: PTSD, defined in accordance with criteria of the Impact of Event Scale-Revised and Posttraumatic Stress Diagnostic Scale.

Outcomes: Physical health, mental health, depression, anxiety, life satisfaction, service utilization.

Measurements: Impact of Event Scale-Revised, Posttraumatic Stress Diagnostic Scale, Hospital Anxiety and Depression Scale, Short-Form Health Survey.

Results: 77.8% of HD patients reported at least 1 traumatic event. The lifetime prevalence for PTSD, independent from trauma type, was 17%. PTSD prevalence only with regard to HD as a potential traumatic event was 10.4%. Women reported more helplessness and more intensive experiences of fear or horror than men with respect to the stressor A criterion. Patients with PTSD showed substantial decreases in mental health in comparison to patients without PTSD ($P < 0.01$). Additionally, greater depression, anxiety, less life satisfaction, and more service utilization were associated with greater posttraumatic symptoms. There was no correlation of physical health with posttraumatic symptoms. In partial correlation analyses adjusting for depression, associations between posttraumatic symptoms, mental health, and anxiety remained robust.

Limitations: Generalizability to other settings, absence of control group, study power.

Conclusions: PTSD is common in HD patients, but little work has been done to explore the variables associated with PTSD. Data suggest that PTSD is underdiagnosed and undertreated in HD patients. Interventions should target these patients with the goal to improve well-being and quality of life.
Am J Kidney Dis 50:594-601. *© 2007 by the National Kidney Foundation, Inc.*

INDEX WORDS: Posttraumatic stress disorder (PTSD); quality of life; depression; anxiety; hemodialysis (HD).

More than 200,000 people in the United States and about 60,000 people in Germany are treated with long-term hemodialysis (HD) therapy for end-stage renal disease (ESRD)[1,2] It has long been recognized that the health-related quality of life of patients with ESRD is significantly decreased compared with that of the general population.[3-10] Empirical studies of psychological strain in HD patients most commonly investigated relationships among depression, anxiety, psychosocial variables (eg, social support and dyadic conflicts), and health-related quality of life indices.[7,10-13] The majority of these studies showed that physical and emotional symptoms were prevalent and could be severe in patients who receive long-term HD therapy.[10,14]

However, to date, no study investigated the correlation between dialysis as a potential psychological trauma and posttraumatic stress disorder (PTSD). Loss of renal function requiring HD leads to dramatic life changes that would be expected to be stressful and require major coping efforts. Posttraumatic symptoms are common in manifestations of chronic illness and have a central role in patients' experiences with life-limiting disease, such as ESRD.[15] The prevalence of PTSD in patients with somatic diseases is around 5% to 10% and therefore considered an important comorbidity. Studies of cancer and human immunodeficiency virus populations showed that PTSD had a strong inverse relationship with health-related

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Received January 25, 2007. Accepted in revised form June 15, 2007. Originally published online as doi: 10.1053/j.ajkd.2007.06.018 on August 16, 2007.

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0272-6386/07/5004-0010$32.00/0
doi:10.1053/j.ajkd.2007.06.018

quality of life and a strong positive correlation with depression and anxiety.[15-17] It seems possible that a similar relationship exists in the long-term HD population. In general, psychiatric disorders are more common in long-term dialysis patients than in the general population and were shown to adversely impact on survival in HD patients.[3,14,18,19]

According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*),[20] PTSD is an anxiety disorder that develops after a severe traumatic event or experience. In the *DSM-IV*, the stressor A criterion is defined as "an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" that invoked a response of "intense fear, helplessness, or horror." The events experienced may be natural disasters, violent personal assaults, war, severe accidents, or the diagnosis of a life-threatening condition. Characteristic symptoms of PTSD include intrusive recollections, such as flashbacks and nightmares; avoidance behavior; emotional numbing; and symptoms of increased arousal.[20] It appears that the development of PTSD is dependent on a complex interaction of pretrauma, peritrauma, and posttrauma variables.[21] With lifetime prevalence rates of 8% to 11% in the US general population, PTSD was identified as a notable mental health problem by a number of epidemiological studies.[22-25] Studies of the impact of PTSD on psychosocial functioning, independent from the study population, provided compelling evidence of considerable psychiatric comorbidity and impairment in a variety of domains, including physical symptoms, depressive and anxiety symptoms, behavioral problems, affect dysregulation, and social interaction problems.[15,26]

The purpose of the current study is to characterize the prevalence and severity of PTSD in patients who receive long-term HD therapy and investigate its correlation with depression, anxiety, health-related quality of life, and service utilization. Knowledge about how to decrease posttraumatic symptoms in this population would be extremely valuable for clinicians providing care to HD patients.

METHODS

Patient Recruitment and Data Collection

Five dialysis centers, including an inner-city university-based dialysis center (University of Duisburg-Essen, Essen, Germany), were selected for patient enrollment to ensure the recruitment of a demographically diverse study population. The total number of patients treated at the 5 dialysis units during the study was 413. Altogether, 180 HD patients were recruited from the dialysis centers. Of these, 155 patients (86.1%) participated and 11 patients were omitted from analyses because of missing or incomplete data for 1 or more study measures; thus, a total of 144 HD patients (80.0%; 73 men, 71 women) were finally included in the study. There was no statistically significant difference between the 144 patients included and the 11 patients missing data in terms of sociodemographic and clinical data. To be included in this study, patients had to be 18 years or older, alert and orientated to time, able to speak German, and have an absence of severe psychiatric disorders. Patient recruitment began on July 5, 2004, and concluded on September 30, 2004. Questionnaires were administered before dialysis treatments. Each patient was invited to participate in the study by a trained research assistant. All participants gave their informed consent to participation after full explanation.

Measures

Traumatic Events

The Posttraumatic Stress Diagnostic Scale (PDS)[27] is a 49-item self-report instrument designed to aid in the diagnosis of PTSD. The structure and content of the PDS mirror *DSM-IV* diagnostic criteria for PTSD. In the validation of the PDS, subjects were recruited for the normative sample from a number of treatment and research centers that have a high frequency of PTSD in their patient populations. Reliability and validity of the scale are satisfactory.[27] By means of a checklist, subjects are asked to report all traumatic events that they witnessed or experienced in the past. Next, subjects are asked to indicate which event disturbed them the most in the past month. In the second section, the stressor A criterion is assessed by 6 yes/no questions inquiring about physical injury to themselves or someone else and how the subject felt at the time of the event. We used the first 2 sections of the PDS for evaluating the stressor A criterion for PTSD according to the *DSM-IV*.

Posttraumatic Symptoms

Posttraumatic psychological symptoms were assessed using the German version of the Impact of Event Scale-Revised (IES-R),[28] a 22-item self-rating questionnaire including 3 subscales (intrusion, avoidance, and hyperarousal). The IES-R is among the most frequently used research instruments in traumatic research. Maercker and Schützwohl[28] suggested a logistic equation for the German version that allows discrimination between positively and negatively screened subjects for PTSD. Data were collected on the IES-R from subjects in different studies. The IES-R has satisfactory psychometric characteristics.[28] Reliability (Cronbach α) in the current study was 0.95.

Subjects responded to the IES-R scale twice. The first part of this scale referred to the worst traumatic event of the checklist of the PDS. In the second part, IES-R referred to HD as the worst potential traumatic event. Hence, 2 PTSD prevalences are presented in the current study.

For the purpose of our study, a screening diagnosis of PTSD was fulfilled if both the *DSM-IV* stressor A criterion for PTSD and a positive screening score according to the IES-R were met.

Anxiety and Depression

To assess depression and anxiety, the study used the Hospital Anxiety and Depression Scale, a 14-item self-report questionnaire with good validity and reliability.[29] Seven items refer to depression, and another 7 items refer to anxiety. Higher scores correlate with more severe depression and anxiety. The Hospital Anxiety and Depression Scale was used in several studies of HD patients and correlated highly with quality of life, functional status, severity of illness, and mortality.[5] Cronbach α in the current study was 0.82.

Quality of Life

To evaluate patient health-related quality of life, we used the Short Form Health Survey with 12 questions (SF-12).[30] Higher scores indicate better health-related quality of life. The SF-12 is a well-documented scoring system widely used and validated as a quality-of-life assessment tool for the general population, as well as for HD patients.[10] The scales of the SF-12 are summarized into 2 dimensions: physical health (Physical Component Summary) and mental health (Mental Component Summary). The SF-12 has satisfactory psychometric characteristics.[30] Cronbach α in the current study was 0.76.

Satisfaction

Life satisfaction was measured by using the following single item: "How satisfied are you with your life?" Response choices were on a 5-point scale (1 indicates not at all; 2, a little; 3, somewhat; 4, very much; and 5, extremely). This single-item approach was used commonly in the literature, and responses were found to be related to psychosocial functioning.[31]

Statistical Analyses

In addition to descriptive statistics, parametric and nonparametric analyses were used. To determine the significance and strength of associations, we used Pearson correlation coefficient r for continuous variables. Unpaired t-tests and chi-square analyses were used to calculate differences between mean values and proportions of groups. All analyses were performed on unweighted data using SPSS, version 14 (SPSS Inc, Chicago, IL). All statistical tests were 2 sided, and differences were considered significant at a level of 5%.

RESULTS

Demographic Characteristics

Patient demographics are listed in Table 1. The total sample consisted of 144 HD patients, 73 men (50.7%) and 71 women (49.3%), who ranged in age from 21 to 90 years. Mean age was 63.1 $\pm$ 14.2 (SD) years. In terms of marital status, 15 patients (10.4%) were single, 90 were married (62.5%), 12 were separated or divorced (8.3%), and 24 were widowed (16.6%) at the time of study participation. Participants were treated with HD from 1 month to more than 5 years, most for more than 5 years (29.9%). Of these patients, 5.6% had undergone renal transplantation. There was no statistically significant difference between the no-PTSD and PTSD-positive groups in terms of age, sex, marital status, education, employment status, and duration of HD therapy. Thus, both groups were comparable.

Trauma and PTSD Prevalence

Independent from trauma type, the general lifetime prevalence of exposure to 1 or more traumatic events was 77.8% (confidence interval [CI], 71.0 to 84.6; n = 112). Twenty-five HD patients (17.4%; CI, 11.1 to 23.7) fulfilled study diagnostic criteria for PTSD in the first part of the IES-R.

Table 2 lists a wide range of traumatic events experienced by patients and the percentage of each trauma that patients identified as the trauma that bothered them most. The most commonly reported traumatic events were life-threatening illness (66.7%; CI, 59.0 to 74.4), followed by serious accident (27.9%; CI, 21.1 to 34.7), combat or war zone (22.3%; CI, 15.5 to 29.1), and nonsexual assault by a stranger (10.5%; CI, 5.5 to 15.5).

Figure 1 shows an overview of the *DSM-IV* stressor A criterion and PTSD prevalence in the total sample and according to sex based on HD as a potential traumatic event. Altogether, 41.7% (CI, 33.6 to 49.8) of the entire sample reported danger of life, 50.5% (CI, 42.3 to 58.7) had feelings of helplessness, and 43.7% (CI, 35.6 to 51.8) reported subjective experiences of fear or horror with respect to dialysis therapy. In addition, 15 patients (10.4%; CI, 5.4 to 15.4) developed PTSD in respect to HD.

Women reported more helplessness (61.1%; CI, 49.8 to 72.4 versus 38.8%; CI, 27.6 to 50.0; $P < 0.02$) and more feelings of fear or horror (57.4%; CI, 46.9 to 68.9 versus 28.6%; CI, 18.2 to 39.0; $P < 0.01$) compared with men. In addition, women had a tendency to more feelings

Table 1. Sociodemographic and Clinical Data

	All Patients (N = 144)	No PTSD (n = 119)	PTSD (n = 25)	*P*
Age (y)	63.1 ± 14.2	63.4 ± 13.9	61.6 ± 15.9	0.6
Sex				0.5
Men	73 (50.7)	62 (52.1)	11 (44.0)	
Women	71 (49.3)	57 (47.9)	14 (56.0)	
Marital status				0.7
Single	15 (10.4)	11 (9.5)	4 (16.0)	
Married	90 (62.5)	76 (65.5)	14 (56.0)	
Separated/divorced	12 (8.3)	10 (8.6)	2 (8.0)	
Widowed	24 (16.7)	19 (16.4)	5 (20.0)	
Missing	3 (2.1)	3 (2.5)	0 (0.0)	
Education				0.2
Other	6 (4.2)	4 (3.5)	2 (8.7)	
Secondary general school certificate	93 (64.6)	82 (71.3)	11 (47.8)	
Intermediate school certificate	21 (14.6)	16 (13.9)	5 (21.7)	
University entrance diploma	18 (12.5)	13 (11.3)	5 (21.7)	
Missing	6 (4.2)	4 (3.4)	2 (8.0)	
Employment status				0.6
Paid work (full- or part-time)	13 (9.0)	11 (9.4)	2 (8.7)	
Unemployed	2 (1.4)	1 (0.9)	1 (4.3)	
Housewife	19 (13.2)	16 (13.7)	3 (13.0)	
Retired	106 (73.6)	89 (76.1)	17 (73.9)	
Missing	4 (2.8)	2 (1.7)	2 (8.0)	
Duration of hemodialysis				0.4
<1 mo	2 (1.4)	2 (1.9)	0 (0.0)	
1-3 mo	6 (4.2)	5 (4.7)	1 (4.0)	
3-6 mo	13 (9.0)	9 (8.5)	4 (16.0)	
6 mo-3 y	40 (27.8)	36 (34.0)	4 (16.0)	
3-5 y	27 (18.8)	22 (20.8)	5 (20.0)	
>5 y	43 (29.9)	32 (30.2)	11 (44.0)	
Missing	13 (9.0)	3 (2.5)	0 (0.0)	
Renal transplantation				
No	121 (84.0)	97 (93.3)	24 (96.0)	0.6
Yes	8 (5.6)	7 (6.7)	1 (4.0)	
Missing	15 (10.4)	15 (12.6)	0 (0.0)	

Note: Values expressed as mean ± SD or number (percent).
Abbreviation: PTSD, posttraumatic stress disorder.

of danger of life than men (50.0%; CI, 38.4 to 61.6 versus 32.7%; CI, 21.9 to 43.5; $P < 0.08$). Finally, men were slightly, although not significantly, less likely to have PTSD than women (8.2%; CI, 1.9 to 14.5 versus 12.7%; CI, 5.0 to 20.4; $P < 0.3$).

Comparison of Patients With and Without PTSD

As listed in Table 3, mean mental health score according to the SF-12 for patients with PTSD was 38.0 compared with 47.7 for patients without PTSD. As expected, patients with PTSD reported significantly greater rates of previous mental health treatment and psychotropic medication use. There was a trend toward greater anxiety and less life satisfaction in patients with compared with without PTSD. There were no statistically significant differences between the 2 groups in terms of physical health dimension of the SF-12 and mean level of depression.

Correlation Between PTSD Symptoms, Depression, Anxiety, Health-Related Quality of Life, and Life Satisfaction

The correlation matrix is shown for the entire sample (Table 4). As expected, mental health significantly correlated with intrusion, avoidance, hyperarousal, and PTSD total symptoms, indicating that patients with higher PTSD symptom scores had decreased health-related quality of life. Additionally, greater levels of anxiety and

Table 2. Types of Traumatic Events (Posttraumatic Stress Diagnostic Scale) Reported by Patients

	Experienced by Patients (%)	Considered Most Traumatic (%)
Accident, fire, or explosion	27.9	12.9
Natural disaster	4.3	0
Nonsexual assault by a family member or acquaintance	4.3	1.0
Nonsexual assault by a stranger	10.0	3.0
Sexual assault by a family member or acquaintance	3.6	1.0
Sexual assault by a stranger	2.1	1.0
Combat or war zone	22.3	5.9
Sexual contact at <18 y of age with someone ≥5 y older	9.9	3.0
Imprisonment	6.4	1.0
Torture	0.7	0
Life-threatening illness	66.7	60.4
Other	19.0	10.9

Note: N = 144.

depression were related significantly to more posttraumatic symptoms. In partial correlation analyses adjusting for depression, associations between posttraumatic symptoms, mental health, and anxiety remained robust.

DISCUSSION

To the best of our knowledge, this is the first study presenting the prevalence of PTSD and its impact on the mental health of HD patients.

Preliminary data from this study show that 77% of HD patients had been through 1 or more psychologically traumatic experiences in the distant or more recent past. The rate of traumatic events in HD patients in our study is not much greater than that in the general population.[22,24,25] Interestingly, the lifetime prevalence of PTSD in our HD patients was 17%, a rate significantly greater than the 7.8% and 9.2% observed by 2 US epidemiological studies.[24,25] However, compared with studies of tertiary referred patients, our prevalence rate of PTSD was less than that in previous US clinical studies, indicating prevalence rates of PTSD up to 43% in both psychiatric inpatients and outpatients.[32-34]

PTSD is a disorder that is relatively common, but frequently not diagnosed in patients with somatic diseases. Presentation of PTSD includes psychological, psychiatric, behavioral, and somatic symptoms.[15,26] In our study, PTSD prevalence with regard to HD was about 10%. On average, more than 8% of men and 12% of

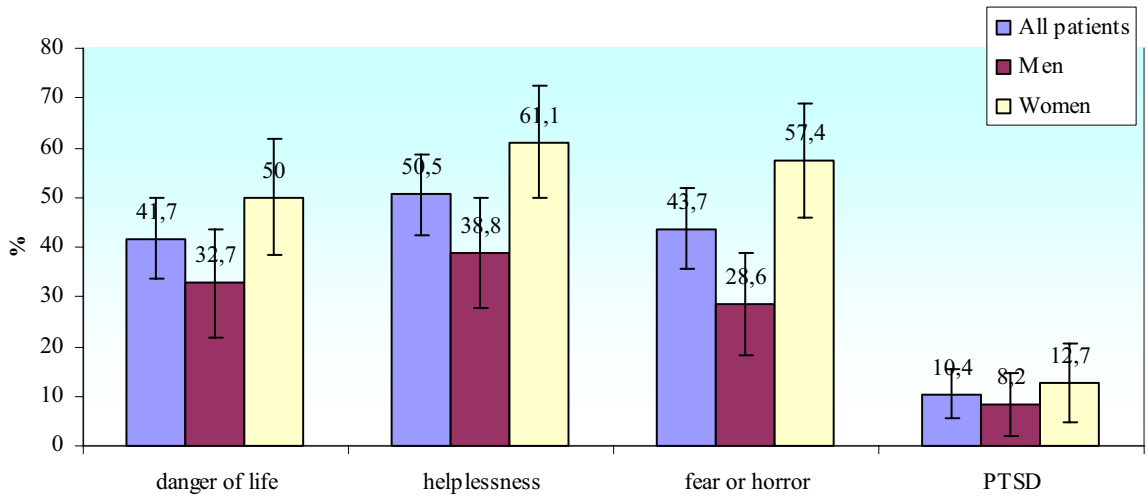

Figure 1. The prevalence of the stressor A criterion and posttraumatic stress disorder (PTSD) according to sex in respect to hemodialysis (N = 144).

Table 3. Comparison of Patients With and Without PTSD

	All Patients (N = 144)	No PTSD (n = 119)	PTSD (n = 25)	*P*
Mental Component Summary, mental health	45.56 ± 11.47	47.77 ± 11.90	38.00 ± 9.98	0.01
Physical Component Summary, physical health	33.7 ± 10.54	34.43 ± 11.20	33.35 ± 8.39	0.8
Depression	6.67 ± 3.87	6.30 ± 3.93	7.46 ± 4.18	0.3
Anxiety	6.83 ± 3.51	6.47 ± 3.61	8.33 ± 3.61	0.07
Life satisfaction	3.45 ± 0.99	3.56 ± 0.91	3.06 ± 1.16	0.07
Mental health treatment (%)	11.4	9.0	26.7	0.05
Psychotropic medication use (%)	26.4	23.9	53.3	0.02

Note: Values expressed as mean ± SD or percent.
Abbreviation: PTSD, posttraumatic stress disorder.

women met diagnostic criteria for PTSD. Our results, although not significant, are in line with other studies showing women to be more affected by PTSD than men.[24,25] Sex differences also were observed with regard to the specific kind of meeting the stressor A criterion for PTSD. Women reported more intensive experiences of helplessness and feelings of fear or horror through HD compared with men. In addition, women tended to have more feelings of danger of life than men.

The mean mental health score for patients with PTSD was highly significantly decreased compared with patients without PTSD. The score of patients with PTSD was 9.7 points lower than that for patients without PTSD and 12 points lower than that for the general population.[30] There was a trend toward greater depression, greater anxiety, and less life satisfaction in patients with PTSD compared with patients without PTSD. According to our results, this impairment is at least as severe as for patients with tumor and other organic diseases.[15] Consistent with previous research,[34,35] we found that patients with PTSD reported more service utilization than patients without PTSD. Empirical studies indicated that mental health–related disorders were common in patients with chronic kidney disease, but were substantially undertreated and led to increased risk of death.[7,11,14] Similar to other studies, patients without PTSD had a greater level of life satisfaction.[26,34] However, there is a lack of studies that assess the prevalence of PTSD and its impact on psychological and physical outcome in HD patients. Only few studies reported that HD patients experienced considerable stress as a result of their daily fluid limitations.[12] Therefore, PTSD may remain underrecognized and undertreated in patients with ESRD.

As expected, physical health did not correlate significantly with posttraumatic symptoms in either the IES-R subscales or PTSD index. Conversely, mental health correlated significantly with PTSD symptoms, indicating that patients with a higher PTSD symptom score had decreased health-related quality of life. Although our study methods do not allow for determination of cause, these findings highlight the poten-

Table 4. Relationship Between PTSD Symptoms, Depression, Anxiety, and Health-Related Quality of Life

	IES-R: Intrusion	IES-R: Avoidance	IES-R: Hyperarousal	IES-R: PTSD-Index
Depression	0.30*	0.23‡	0.36†	0.34†
Anxiety	0.44†	0.31*	0.47†	0.42†
Mental Component Summary, mental health	−0.43†	−0.36*	−0.50†	−0.46†
Physical Component Summary, physical health	−0.09	−0.19	−0.16	−0.19
Age	−0.032	0.07	0.04	0.07

Note: N = 144.
Abbreviations: PTSD, posttraumatic stress disorder; IES-R, Impact of Event Scale-Revised.
*$P < 0.01$.
†$P < 0.001$, 2-tailed.
‡$P < 0.05$.

tial interplay of PTSD symptoms and the important dimension of mental health in the SF-12, which was linked to increased morbidity and mortality in patients on dialysis therapy.[3,14,36] All in all, our results emphasize the hypothesis that the relationship between PTSD and mental health may be clinically relevant. Cross-sectional and longitudinal studies showed that decreased quality of life, greater depression, and anxiety were associated with greater PTSD symptoms.[26]

The limitations of the present study should be noted. First, the study does not allow causal interpretations because of its retrospective and cross-sectional nature. However, that is a common limitation of cross-sectional data; therefore, a longitudinal or intervention study is needed to address the issue of causality. The second limitation regards the power of the study. The PTSD group was small compared with the no-PTSD group. In such a small group, only very strong associations reach statistical significance. Another possible limitation is that PTSD was assessed by means of 2 standardized self-report instruments (PDS and IES-R) instead of a standardized diagnostic interview. Finally, this is a single-geographic-area study, which limits the generalizability of the findings. However, demographic characteristics of our study patients generally were similar to the broader German HD population.

In summary, this study shows that PTSD is common in HD patients and is associated with high psychological distress and high service utilization. The systematic use of screening instruments for PTSD may help medical personnel identify HD patients who need special care to improve their well-being and life satisfaction. Additional studies must investigate the effect of dialysis as a potential traumatic event on mental health and interventions on long-term outcome in HD patients with ESRD. With a PTSD prevalence of about 10% with respect to HD as potential traumatic event, the disorder is not rare. Therefore, it is important to determine whether early detection of PTSD in HD patients will improve outcomes.

ACKNOWLEDGEMENTS

Support: None.
Financial Disclosure: None.

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